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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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09/914,404

12/13/2001

Richard Spitz

10191/1993

5115

26646

7590

05/22/2002

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EXAMINER

ESTRADA, MICHELLE

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 05/22/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/914,404

Applicant(s)

SPITZ ET AL.

Examiner

Michelle Estrada

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-28 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 13-28 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 13-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "high" in claims 13, 17 and 18 is a relative term, which renders the claim indefinite. The term "high" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. If applicant intends any particular temperature, it must be clearly recited.

ob The term "deep" in claim 13 is a relative term, which renders the claim indefinite. The term "deep" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. If applicant intends any particular depth, it must be clearly recited.

ob In claim 13, line 9, it appears that "a" should be replaced with --the--, unless another step is intended.

In claim 19, line 2, it appears that "a" should be replaced with --the--.

In claim 19, line 3, it appears that both "a" should be replaced with --the--.

In claim 19, line 4, it appears that "a" should be replaced with --the--.

In claim 20, lines 1-3, it appears that "a" should be replaced with --the--.

In claim 23, lines 2 and 4, it appears that "a" should be replaced with --the--.

In claim 24, lines 2 and 4, it appears that "a" should be replaced with --the--.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 13-14, 16-19, 21 and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Rosnowski (4,099,997).

Rosnowski discloses applying a solid glass layer (18/19) by chemical vapor deposition (Col. 2, lines 24-25), provided with a dopant on at least one of two sides of the semiconductor wafer (12); heating the semiconductor wafer to a high temperature so that the dopant from the solid glass layer penetrates deep into the semiconductor wafer to produce the at least one doped region (28/32) (Col. 3, lines 11-18); removing the solid glass layer (Col. 3, lines 41-42); and providing a dopant dosage of at least 1×10^{18} atoms/cm³ (Col. 3, lines 15-17); wherein the step of heating the semiconductor wafer is performed in an oxidizing atmosphere (Col. 2, lines 44-48); maintaining the high temperature for about 20 to 140 hours, this range overlaps with that of the present

invention; wherein the solid glass layer is applied both on the front side of the semiconductor wafer and on the back side of the semiconductor wafer, the doping type of the dopant on the back side being opposite compared to the doping type of the dopant on the front side (Col. 2, lines 20-23); wherein the solid glass layer has a dopant constituent of 17% to 20% by weight (Col. 2, lines 29-30); wherein the solid glass layer has a thickness of about 6000Å.

The choice of a particular thickness for the solid glass layer would have been a matter of routine optimization because thickness is considered a result effective variable. See MPEP 2144.05.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 15, 22 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosnowski as applied to claims 13-14, 16-19, 21 and 25 above, and further in view of Schwalke (5,496,765).

Rosnowski does not disclose the chemical vapor deposition operation is performed as atmospheric pressure; the solid glass layer has a dopant constituent of

Art Unit: 2823

about 3 to 6 percentage by weight; and that the step of removing the solid glass layer is performed in accordance with hydrofluoric acid.

Schwalke discloses depositing a doped glass (BSG) layer (7) on a semiconductor wafer 1 by a CVD method at atmospheric pressure (APCVD) (Col 4, lines 26-28; the doped glass has a dopant constituent of 4% by weight, this overlaps the range of the instant invention (Col. 4. lines 29-30); heating the wafer to diffuse the dopants and removing the glass layer using hydrofluoric acid (Col. 4,lines 48-51).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Rosnowski and Schwalke to enable formation of the doped glass layer and further removing the glass layer after formation of diffusion region avoids an uncontrolled drive-out from these layers or a contamination of the equipment during the course of the further process execution (Col. 1,lines 62-64).

Claims 20, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosnowski as applied to claims 13-14, 16-19, 21 and 25 above, and further in view of Barden et al. (4,889,492).

Rosnowski does not disclose that the doping type of the dopant on the back side of the semiconductor wafer being opposite or different compared to the doping type of the dopant in the front side.

Barden et al. discloses depositing two layers of doped glass (54/60) on a semiconductor wafer (38); the dopant of the second layer of doped glass (60) must be

Art Unit: 2823

of a different type of conductivity from that of the first dopant glass (54) (Col. 5, lines 7-19).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Rosnowski and Barden et al. to enable formation of the doped glass layer of Rosnowski and further providing different type of dopants having different diffusion rates.

Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosnowski as applied to claims 13-14, 16-19, 21 and 25 above, and further in view of Shinohara (JP 59-80928).

Rosnowski does not disclose further applying a neutral glass layer on the solid glass layer prior to heating the semiconductor wafer; and removing the neutral glass layer together with the solid glass layer after heating the semiconductor wafer; the neutral glass layer has a thickness of about 0.5 micrometers.

Shinohara discloses applying a neutral glass (13) on a substrate (1) prior to heating the semiconductor substrate and removing the neutral glass after heating (Abstract and Figs. 3 and 4).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Rosnowski and Shinohara to enable formation of the heavily doped semiconductor components of Rosnowski and further the neutral glass layer protects the solid glass layer and prevents the dopants from leaking to the atmosphere.

Art Unit: 2823

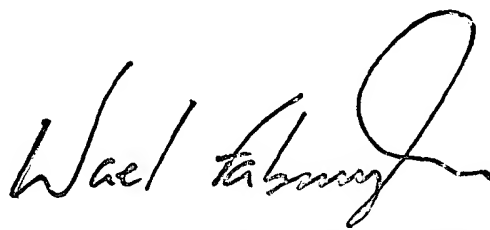
The choice of a particular thickness for the neutral glass layer would have been a matter of routine optimization because thickness is considered a result effective variable. See MPEP 2144.05.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 703-308-0729. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431 and 3432) for regular communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


MEstrada
May 13, 2002


SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2000